

MINISTRY OF WATER AND IRRIGATION

Water Resource Policy Support Groundwater Management Component

Rehabilitation and upgrade of the Groundwater and Wadi Flow Monitoring Networks Amman – Zarqa Basin

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Executive Summary

This report presents an Assessment of the current groundwater and surface water monitoring networks in Amman-Zarqa Basin (AZB), and illustrates details of achievements and proposed actions for the rehabilitation and upgrade of both networks.

1. Groundwater Level Monitoring Network

1.1 Current Status

Currently, the groundwater level monitoring system in AZB include 78 wells, with 59 operating and 19 non-active. The operating wells include 44 and 15 static water level (SWL) and Dynamic water level (DWL), respectively. The majority of these wells monitor the B2/A7 and the basalt aquifers. The Non active wells include 7 wells drilled previously for monitoring and presently in use for production.

1.2 Achievements and Recommended Actions

A two phases rehabilitation program was conducted for the SWL monitoring wells in AZB during the year 2001.

- Phase one was conducted in early 2001 by the MWI, and resulted in the rehabilitation of the following four wells:

AL1444,

AL1539,

AL2697,

AL2704.

- Phase two was implemented by the MWI/ARD Water Resources Policy Support Project during April-May/2001. It resulted in the rehabilitation of the following seven wells:

AL3385,

AL3387,

AL3389,

AL3392,

AL3395,

AL3397,

AL3430.

Note that well No.AI-3397 was found dry despite the fact it reached a depth of 264 m, which is typical of the B2/A7 in the Ba'ej area.

- A maintenance program was also conducted by MWI / ARD for 17 monitoring wells. It includes Installation of shelter boxes for six of the wells, and re-painting and change of shelter box locks for the remaining 11 wells.

The following recommendations are proposed to improve the groundwater monitoring network:

- Discontinue 22 monitoring wells because of their proximity to operating observation wells .
- Drill two wells in the northeastern part of the basin, penetrating the B2/A7 aquifer to cover data gaps in that area.

2. Groundwater Quality Monitoring Network

2.1 Current Status

The AZB water quality monitoring network includes 114 wells, 71 operating and 43 non-active. The operating monitoring wells serve mainly the B2/A7, the basalt, the Kurnub, and the Hummar aquifers.

2.2 Recommended Actions

- Reactivate 26 monitoring wells.
- Add 10 new monitoring wells, with 8 wells for the basalt B2/A7 aquifer system and 2 wells for the Zarqa group aquifer system, to cover data gaps.
- Discontinue 32 wells because of their proximity to operating monitoring wells.

3. Wadi Flow Monitoring Network

Originally, AZB includes 8 active Wadi flow gauging stations, which are mainly located in the area extending from Dulayl to Jerash. An additional wadi flow gauging station was installed at wadi Zatari in the north Badia area by MWI /ARD Project during April-2001, to cover lack of runoff information in the North Badia Area.

1. Introduction

Monitoring of water resources provides the basic data required for planning and policy analysis, determination of safe yield and predictive analysis as well. Based on that, an integrated water quantity and quality monitoring network is essential and important to understand the present and changing status of water resources, and to define and enforce measures to implement policies with regard to water use.

In the Hashimite Kingdom of Jordan, The Ministry of Water and Irrigation (MWI) is the responsible governmental institution, for managing and supervising the water resources (ground & surface) quantity and quality.

Providing the technical support for MWI to upgrade and rehabilitate the monitoring network in the Amman-Zarqa Basin (AZB) is one of the important activities of the Water Resources Policy Support Project.

During the 1994-1998 period, the Water Quality Conservation Project participated in rehabilitating and upgrading the monitoring system in the AZB through drilling a series of groundwater monitoring wells, rehabilitation / installation of new surface water monitoring stations, and evaluating the springs and the hydrometeorological stations monitoring networks (reference Nos.1 &2) .

Presently, the groundwater monitoring system in the AZB includes: (1) static water level monitoring wells (SWL), (2) dynamic groundwater monitoring wells (DWL), and (3) groundwater quality monitoring wells. While the surface water monitoring program include : (1) precipitation stations (2) evaporation stations (3) wadi flow measuring stations, in addition to a springs quantity and quality monitoring program.

This document discusses the current status of the groundwater and the wadi flow monitoring systems in AZB. It also presents achievements and recommendations for the rehabilitation and upgrade of these monitoring systems.

2. Ground Water Level Monitoring Network

2.1 Current Status

The water level monitoring system in the Amman – Zarqa Basin include 78 wells. These wells can be classified under two major groups: The static water level (SWL) and dynamic water level (DWL) wells.

2.1.1 Monitored Aquifers

- **Basalt Aquifer**

Basalt aquifer outcrops in the northern parts of the basin, covering an area extending from Dulayl and Hallabat to the Syrian borders. In the north and northeastern parts of the basin, the basalt overlies the Rijam formation, and in Mafrq and Hallabat areas, it overlies the B2/A7.

Wells penetrating this aquifer are concentrated in the Hallabat, Dhulaiel areas, and the northeastern parts of the basin. Recently and after a long period of over-pumping, most of the wells extracting water from this aquifer are facing a decline in water level, and water salinity problems. This aquifer is monitored by only three active water level monitoring wells in AZB.

- **The “B2/A7” Aquifer**

The B2/A7 group forms the major and most important aquifer in Jordan. This aquifer composed of Karstified carbonate rocks represented by massive bedded limestone and cyclic deposits of chalk, phosphate, limestone and chert.

Hydrogeologically this aquifer represents the main exploited aquifer in AZB. It has a large and continuous extent over the middle part of the basin from the South/southwestern corner around Amman city to the Syrian borders in the north. Presently major part of the production wells in this basin are penetrating and extracting water from this aquifer.

In AZB, the B2/A7 aquifer is over-abstracted, resulting in water level decline and water Salinity problems. This aquifer is monitored by 38 active water level monitoring wells in AZB.

- **The Hummar “A4” Aquifer**

The A4 aquifer consists of light gray and dark gray dolomitic limestone. Within the AZB, this aquifer is used for water supplies in Amman-Zarqa and Suknah areas. The A4 is monitored by 11 active water level monitoring wells .

- **The Nau’r “ A1/A2” Aquifer**

The A1/A2 consists of two nodular gray limestone and dolomitic limestone beds separated by marl and shale. Within the AZB, this aquifer outcrops in the west and southwestern parts of Amman. It is monitored by 2 active water level monitoring wells.

- **The Kurnub “K” Aquifer**

In the AZB, small outcrops in the Baqa, Jerash and Zarqa river area characterize this aquifer. Recharge to this aquifer is limited to those outcrops and by leakage from the overlying carbonate aquifers. This aquifer is monitored by 4 active water level monitoring wells.

- **The Zarqa “Z” Aquifer**

The oldest exposed rocks in the basin represents the Zarqa group, (Triassic-Jurassic age). This aquifer system composed mainly of sandstone, marls, dolomite, shale and limestone. The main outcrops of the Zarqa aquifer occurs in the deeply eroded wadis in the Zarqa valley area. This aquifer is monitored by only 1 active water level monitoring well.

2.1.2 Static Water Level Monitoring Wells

A total number of 44 observation wells are used to monitor the static water level in the AZB. The majority of these wells are distributed in the southern half of the basin and concentrated in the area located between Amman and Zarqa cities. Table (1) presents a list for these wells, which are summarized as follows:

- The Basalt aquifer is monitored by only 2 wells.
- The majority of these wells (31) monitor the B2/A7 aquifer, with 23 located in the middle, southern and southwestern parts of the basin. While both areas of Zatari and the North Badia, which are characterized by high water consumption, are covered by only eight wells.
- The Hummar aquifer is monitored by 7 wells, with 6 located in the area between Balama and Amman and only one well No. AL-3522, located within the Zatari / North Badi area.
- The Kurnub aquifer is monitored by 3 wells, located in Balqa and Zatari areas.
- The Zarqa aquifer is monitored by one well.

2.1.3 Dynamic Water Level Monitoring Wells

A total number of 15 production wells are used for monitoring the dynamic water level in the AZB. The distribution of these wells per aquifer is shown in Table (2) and summarized as follows:

- The Basalt aquifer is monitored by one well,
- The B2/A7 aquifer is monitored by 7 wells
- The Hummar aquifer is monitored by four wells
- The A2/A1 aquifer is monitored by two wells.
- The Kurnub aquifer is monitored by one well.

2.1.4 “Non – Active” Water Level Monitoring Wells

In the late 2000, the total number of non active monitoring wells in AZB were 30, divided into the following categories:

- 3 Dry Wells: AL1231, AL1789, and AL3521.
- 14 Vandalized Well: AL1115, AL1444, AL1539, AL2695, AL2697, AL2704, AL3385, AL3387, AL3389, AL3392, AL3393, AL3395, AL3397, and AL3430.
- 7 Production Wells: AL1892, AL1906, AL2333, AL2689, AL2719, AL2720, and AL3383.
- 6 Abandoned Wells: AL1006, AL1791, AL1928, AL3308, AL3396 and F1079.

2.2 Rehabilitation and Upgrade Plan

The achievements and proposed actions for the water level monitoring wells are discussed below, and presented in Figure Nos. 1, 2, 3, 4, 5, and 6 for the Basalt, B2/A7, Hummar (A4), Nau'r (A1/A2), Kurnub and Zarqa aquifers, respectively. In addition, a list for all water level monitoring wells in AZB is presented in Annex (I).

2.2.1 Achievements

• Rehabilitation of Water Level Monitoring Wells

Site visits to the monitoring wells within the AZB and analysis of their available data indicated the need for rehabilitating the following water level monitoring wells:

- Well Nos. Al-3385, Al-3387, and Al-3389 are located in the center of the basin within Samra/Balama area, which is considered as an important agricultural/ Industrial area with a recognizable water consumption.
- Well No Al-3392 is located in the southern part of the basin and was drilled previously during the water quality improvement project, to monitor the effect of the industrial sector activities, on the groundwater resources quantity and quality.
- Well Nos. Al-2697 and Al-2704 Al-3395, and Al-3397 are located in the northeastern part of the basin within North Badia area, where the highest groundwater consumption for agricultural demands is recorded.
- well Al-3430 was used for Monitoring the A4 aquifer in Amman City.
- Well No. Al-1444 and Al-1539 monitor the Kurnub aquifer. They are located in the Zarqa and Balqa areas, respectively.

A two phases rehabilitation program was conducted for the SWL monitoring wells in AZB during the year 2001. Phase one was conducted in early 2001 by the MWI, and included the rehabilitation of the following four wells:

AL1444

AL1539

AL2697

AL2704

Phase two was implemented by MWI/ARD *Water Resources Policy Support* Project during April-May/2001 (Plate-1). It resulted in the rehabilitation of the following seven wells:

AL3385

AL3387

AL3389

AL3392

AL3395

AL3397

AL3430

Note that well No.AI-3397 was found dry despite the fact it reached a depth of 264 m, which is typical of the B2/A7 in the Ba'ej area.



Plate 1: Rehabilitation of a water level monitoring well in AZB.

In addition, a maintenance program by MWI/ARD was conducted in May-2001 for 17 monitoring wells in the basin (Plate 2) and included :

- Installation of shelter boxes on concrete bases for six wells.
- External maintenance, include re-painting and change the shelter box locks for the remaining 11 wells.



Plate 2: Maintenance Program For Water Level Monitoring Wells in AZB.

2.2.2 Recommended Actions

• Discontinuation of Water Level Monitoring Wells

Based on the analysis of the available water level monitoring data, it is recommended to discontinue 22 wells from groundwater level monitoring network. Table (3) presents a list for these wells, which are summarized below:

- Discontinue 15 monitoring wells because of their proximity to operating monitoring wells.
- Discontinue 7 wells, which were originally drilled for monitoring purposes, but are presently used for production.

• Drilling of New Wells

In order to cover the data gaps in the northeastern part of the AZB, it is recommended to drill two wells, to penetrate the B2/A7 aquifer in the latter area.

Detailed design specification for those wells, will be prepared based on the final selection of the well location and total well depth. In general the well design will be based on the following criteria:

- The proposed design includes 6 5/8 inch casing and screen for the entire well length.
- The well will be open only for the target aquifer.
- Casing and cementing of annulus should isolate other penetrated aquifers.
- The well is completed with a gravel pack around the screened interval and the remaining borehole annulus is grouted to the ground surface.
- A continuous water level record will be installed in each well.
- Strong steel seal box should be installed on the wellhead to prevent vandalism.
- An MWI identification number will identify each of these wells.

3. Water Quality Monitoring Network

3.1 Current Status

The AZB water quality monitoring network includes 114 wells, 71 operating and 43 non-active. Table (4) presents a list of these wells per monitored aquifer, as summarized below:

- The Basalt aquifer is monitored by 14 wells scattered within Hallabat and the North Badia. Only 9 of these wells have updated water quality records.
- The B2/A7 aquifer system is monitored by a total of 68 wells, out of which 41 have updated water quality records. The majority of these wells are concentrated in middle and southern parts of the basin. None of the 8 wells located in the north Badia area have updated water quality records.
- The Hummer (A4) aquifer is monitored by 9 wells, located within the southwestern corner of the basin, with updated water quality records.
-
- The Na'aur (A1/A2) aquifer is monitored by 5 wells, distributed within the western part of the basin, with updated water quality records.
-
- The Kurnub (K) aquifer is monitored by 18 wells, out of which 7 have updated water quality records. All of these wells are located in the western part of the basin within the Balqa area and very close to each other.

3.2 Recommended Actions

Recommended actions for the water quality monitoring wells in AZB are listed below, and presented in Figure Nos.7, 8, 9, 10, 11 and 12 for the Basalt, B2/A7, Hummar (A4), Nau'r (A1/A2), Kurnub and Zarqa aquifers, respectively. In addition, a list for all water quality monitoring wells in AZB, is presented in Annex (II).

• Reactivation of Water Quality Monitoring Wells

Review of the water quality monitoring network indicates the need for reactivating 26 monitoring wells as shown in Table (5) and listed below:

- 20 wells to monitor the B2/A7 aquifer all over the basin.
- 3 wells with long monitoring record to monitor the Kurnub aquifer in Baqa'a area.
- 2 wells to monitor the Basalt aquifer in the eastern parts of the basin.
- 1 well to monitor the Hummar aquifer in Balama area.

• Addition of New Wells

The review of distribution of the water quality monitoring network in AZB, indicate the lack of monitoring wells in both north Badia and Zatari areas. It is recommended to include the following wells, to the water quality monitoring network.

- Well No. AI-2370, AI-2594, AI-3065, AI-3466 and F-3930, for the B2/A7 aquifer system.
- Well No. AI-1462 and AI-2498 for the Basalt aquifer.
- Well No. AI-3394 for the Kurnub aquifer.
- Well No. AI-1421 and AI-2808 for the Zarqa group aquifer and located in the western part of the basin.

- **Discontinuation of Monitoring Wells**

It is recommended to discontinued 32 water quality monitoring wells, which are located in the proximity of operating monitoring wells. These wells are listed in table (6).

4. Wadi Flow Monitoring Network

Originally, AZB includes 8 active Wadi flow gauging stations, which are mainly located in the area extending from Dulayl to Jerash, as shown in table (7) and summarized below:

- 2 stations (AL0063 & AL0064) in south of As Samra / Balama area.
- 2 Stations (AL0062 & AL0065) in eastern and southern parts of Amman.
- 2 stations (AL0040 & AL0061) in the northern parts of Balqa area.
- 1 station (AL0060) in south of Jarash.
- 1 station (AL0068) in the western corner of the basin.

An additional wadi flow gauging station was installed at wadi Zatari in the north Badia area by MWI/ *ARD* Project during April-2001, to cover lack of runoff information in the North Badia area. Figure (13) presents the location of these stations in the basin.



Plate 3: Installation of Wadi Flow Measuring Station at Wadi Zatari - AZB.

Table 1: Current Status of Active SWL Monitoring Wells in AZB

Well ID	Well Name	Aquifer	Depth (m)	Operation Year	PGN	PGE
AL1040***	TW5 / W. ZA'TARI (PP 157)	B2/A7	165	1968	562545	432555
AL1041***	TW6 / W. DHULEIL (PP 158)	B2/A7	155	1968	556083	433655
AL1043***	TW15 / N. DHULEIL (PP 160)	B2/A7	234	1968	556287	428160
AL1179	Refinery 6	A4	240	2000	555089	417150
AL1300***	Awajan Observation	B2/A7	155	1972	545034	413784
AL1430	Baq'a 3 (W.S.C)	K	276	1985	550439	390088
AL1444**	Ain El Ruseifa 8/Observ. Well	B2/A7	123	1985-1998	543444	406929
AL1521	Husain Air Force Base(Ba'ij)	B2/A7	264	1986	578201	432194
AL1539**	BAQ'A 11 (W.S.C)	K	256	1986-1994	547934	391286
AL1734***	Zerqa Observation 1	B2/A7	190	1988	542727	415997
AL1782	Race Club No 13	A4	366	1988	537898	404752
AL1792	Madouneh No4	B2/A7	220	1997	534298	417609
AL1813	Awsa 5 Noureddeen	B2/A7	60	1997	537764	401868
AL1851	Mercury 5	B2/A7	205	1999	541163	407669
AL1859	Awsa 1 (Ras El Ain 1)	B2/A7	100	1999	535637	398201
AL1926	A'qib Dam Obs.1-Khaldiyyeh	BAS.	162	1986	559278	437849
AL2413	Hallabat 5	B2/A7	140	1999	550469	440947
AL2698	Hallabat Obs. 1	B2/A7	120	1988	553671	442134
AL2697**	Hussayniyat Obs.1	B2/A7	253	1986-1991	584422	441389
AL2699***	Hashimiya Obs. 6	B2/A7	143	1988	555532	418958
AL2700	Samra Obs 1	B2/A7	101	1988	558030	419119
AL2702***	Samra Obs 3	B2/A7	104	1986	557089	416733
AL2704**	North Badiya Obs.1	B2/A7	375	1989-1991	564322	456313
AL2808	Mu'addi Obs.1	Z	383	2000	560814	370288
AL3283	Hallabat 6	B2/A7	156	1997	550166	440942
AL3349	Wadi El Qattar 7	B2/A7	400	1997	532233	409953
AL-3361	Aqib 3 (Km97.5)	BAS	487	2000	570942	449070
AL3384	Hallabat Monitoring 2	B2/A7	175	1997	565561	440982
AL3385*	Ruseifa Landfill Monit. 2	B2/A7	102		543091	411553
AL3386***	Ruseifa Landfill Monit. 3	B2/A7	101	1998	542933	410947
AL3387*	Samra Monitoring 4	B2/A7	125		559651	425996
AL3389*	Zarqa Indust.Monit. 2	B2/A7	117		556702	415276
AL3390	Tafeh East Monit. 1	B2/A7	121	1997	550614	426901
AL3391***	Tafeh South Monit. 2	B2/A7	219	1998	541992	426557
AL3392*	Wadi Ishash Monit.1	B2/A7	95		544432	413911
AL3394	Thaghret Al Job Monit. 1	K	181	1997	569593	427043
AL3395*	Sabha Monit.1	B2/A7	310		581592	446488
AL3396***	Hussayniyat Monit.2	B2/A7	265		571693	440615
AL3430*	Maqarr Investigation 14b	A4	356	1999	536727	400644
AL3519	Sukhneh Monit.	A4	232	2000	557142	406181
AL3520	Yajuz 1 Monit.	A4	230	2000	543507	395904
AL3522***	Za'tari Monit.	A4	490	2000	570444	431907
AL3523	Ruseifa Monit. 1	A4	373	2000	535172	405820
F1358	NDW-3	B2/A7	550	1985	554767	460981

Note:

* Rehabilitated and Maintained by MWI/ARD Water Resources Policy Support Project- April/May 2001

** Rehabilitated By the MWI - YEAR 2001

*** Maintained by MWI/ARD Water Resources Policy Support Project- April/May 2001

Table 2 : Current Status of Active DWL Monitoring Wells in AZB

WELL ID	Well Name	Aquifer	Depth (m)	Operation Year	JTM-N	JTM-E
AL1022	Dp 16 NRA (PP 315)	BA.	100	1998	560005	434613
AL1230	Hashimiya No 3	B2/A7	102	1999	555080	417840
AL1351	Ruseifa Municipality 1	B2/A7	31	1999	543838	409431
AL1352	Ruseifa Municipality 2	B2/A7	80	1999	543897	409192
AL1371	Jamal Flour Mill	B2/A7	35	2000	537038	401264
AL1541	Baq'a 9 (W.S.C)	K	203	1992	549838	391997
AL1548	Awsa Seil El Rusaifeh No 3	A4	426	1999	543203	405302
AL1551	Ruseifa Municipality 4	B2/A7	98	1998	543779	409813
AL1637	Yajuz No. 1	A4	192	1999	544363	401030
AL1641	Yajuz No. 6	A4	36	2000	545690	396990
AL1689	Ain Ghazal Seil El Rusaifa 2A	A4	440	1999	542010	404822
AL2690	Ain Ghazal Station 2 (New)	B2/A7	113	2000	539415	402989
AL2714	Race Club No 18	B2/A7	192	1998	538846	405630
AL3324	Ain Ghazal Deep No 4	A1/A2	433	1999	543350	405454
AL3343	Wadi El Qattar 1	A1/A2	162	1998	535539	409087

Table 3: Proposed Wells to be Discontinued from the Water Level Monitoring network in AZB.

Well ID	Well Name	Aquifer	Depth (m)	Justification
AL1006	DP 6	B2/A7	110	Doubtful Data
AL1115	Zayid 2 Army	B2/A7	86	Technical problems in the well casing
AL1231	Mohammad A'del Sharif	Allu.	15	Dry
AL 1551	Ruseifa Municipality 4	B2/A7	98	Active DWL monitoring well-Very close to Al-1352.
AL1689	Ain Ghazal 2a	A4	440	Active DWL monitoring well - Same Water Level Trend of Al-1548
AL1789	Madouneh No1	B2/A7	203	Dry well. To be Discontinued
AL1791	Madouneh No3	B2/A7	177	Well Al-1792 is used instead of this well
AL1892	Baq'a Exp 6 Observation	K	198	Production Well
AL1906	Refinery 9	B2/A7	122	Production Well
AL1928	A'qib Dam Obs.3-Khaldiyeh	BAS.	201	Aqib 1 well is used instead of this well
AL2333	Race Club No.29	B2/A7	222	Production Well
AL2413	Halabat 5	B2/A7	140	Limited data and very Close to AL3283
AL2689	Km 107 Bagdad Road No 13 A	BAS.	395	Production Well
AL2695	Ba'ej 1 Obs.	B2/A7	261	Technical problems in the well casing
AL2719	Baq'a 12 Observation	K	195	Production Well
AL2720	Waste Disposal Monit.Well	B2/A7	79	Production Well
AL3308	Mohajreen2	B2/A7	246	Closed by Amman municipality
AL3383	Hamidiya Monitring 1	B2/A7	450	Production Well
AL3393	Pepsi Pool Mon.1	B2/A7	120	Close to Active SWL wells
AL3397	Ba'ej Monit. 3	B2/A7	264	Dry Well. After rehabilitation
AL3521	Yajuz 2 Monit.	A4	315	Dry Well since being drilled
F1079	Km111	BAS.	386	Technical problems in the well casing

Table 4 : Current Status of the Water Quality Monitoring Wells in AZB.

Well ID	Well Name	Aquifer	JTM-N	JTM-E	Present Status
AL1005	F.Shliief	BAS.	559060	438061	Active
AL1022	Dp16nra	BAS.	560005	434613	Active
AL1072	Arnous Al Uqial	B2/A7	556339	427603	Active
AL1076	Saeed Qtashate2	B2/A7	555556	429711	Active
AL1078	Subhi Jab	B2/A7	556031	429825	Active
AL1086	Jack Khayyat	B2/A7	556118	434866	Active
AL1088	Shihada Twal 2	B2/A7	552308	428644	Active
AL1093	Abdulhamead Frahat	B2/A7	550859	444067	Active
AL1109	Wasfi El-Tal 1	BAS.	554735	443152	Active
AL1115	Elkhirbeh El Samra	B2/A7	543453	451115	Proposed By WQIC-Not Active
AL1118	Elkhirbeh El Samra	B2/A7	559822	419632	Proposed By WQIC-Not Active
AL1120	Ali Abu Adaila	B2/A7	561608	416847	Active
AL1168	Electrical Thermal	B2/A7	555231	417498	Active
AL1169	Electrical Thermal	B2/A7	555259	417643	Active
AL1170	Electrical Thermal	B2/A7	555303	417079	Active
AL1175	Refinery 2	B2/A7	556227	416254	Proposed By WQIC-Not Active
AL1176	Refinery 3	B2/A7	555752	416551	Active
AL1177	Refinery 4	B2/A7	555389	416675	Active
AL1205	Ahmad Abdelhameed	BAS.	556874	412128	Active
AL1230	Hashimyia No3	B2/A7	555080	417840	Proposed By WQIC- Active
AL1275	Jordan Beer Co.	B2/A7	547221	413630	Active
AL1276	Distillation Co.	B2/A7	547160	413562	Active
AL1307	Jordan Diary Co.	B2/A7	544178	412340	Proposed By WQIC- Active
AL1318	Awajan 22	B2/A7	545360	413458	Active
AL1319	Awjan 21	B2/A7	545429	413485	Active
AL1346	Phosphate Mines 8	B2/A7	543521	412824	Proposed By WQIC-Not Active
AL1360	Polytechnique 1	B2/A7	540954	407452	Active
AL1377	Ibrahim Eshshami	K	547307	390895	Abandoned
AL1381	Shawkat Sboul	K	547807	390482	Abandoned
AL1385	Alluminumco.1	K	548781	391782	Abandoned
AL1389	Salem Abbasi	K	551408	390678	Abandoned
AL1393	Abu Nusair	K	550601	393010	Active
AL1394	Jordan Tiles & Blocks	K	551545	393991	Active
AL1395	Abdul Kaream Wraikat1	K	551136	392134	Abandoned
AL1398	Jafer Shami 1	K	551243	391400	Abandoned
AL1425	Baq'a 2	K	549513	390239	Active
AL1428	Baq'a 1	K	549682	391598	Abandoned
AL1432	Baq'a 5	K	547471	390698	Abandoned
AL1433	Baq'a 6	K	548396	391173	Active
AL1474	Nabbel Abdellateef	B2/A7	581759	440275	Abandoned
AL1540	Baq'a 10	K	547924	391296	Abandoned
AL1541	Baq'a 9	K	549838	391997	Active
AL1542	Yazidiyya No3	A4	548475	385733	Active
AL1548	Awsa Seil El Rusaifa	A4	543203	405302	Active
AL1551	Ruseifa Municipality	B2/A7	543779	409813	Active
AL1575	Abdelkareem Wraikat 3	K	551165	392159	Abandoned
AL1608	Faleh Mustafa	A1/A2	570349	398676	Active
AL1619	Suleiman Meqbel 1	B2/A7	559770	413076	Active
AL1620	Barakah Mustafa	B2/A7	559993	412290	Active
AL1622	Saleh Khalifa	B2/A7	558849	414922	Active

Well ID	Well Name	Aquifer	JTM-N	JTM-E	Present Status
AL1627	Yazidiyya No2	B2/A7	548950	384201	Active
AL1637	Yajuz No.1	A4	544363	401030	Active
AL1641	Yajuz No.6	A4	545690	396990	Active
AL1684	Metal Factory	B2/A7	544717	406095	Abandoned
AL1710	Pepsi Cola 2	B2/A7	541842	405913	Active
AL1711	Pepsi Cola 3	B2/A7	541688	406057	Active
AL1762	Wasfi Ettall No2	BAS.	554746	443712	Active
AL1789	Madouneh No1	B2/A7	531256	414688	Dry
AL1821	Ain Ghazal S8	A4	540581	403508	Active
AL1826	Ruseifa 18/Amman	A4	543809	408229	Active
AL1830	Awsa 21	B2/A7	535757	398828	Proposed By WQIC- Active
AL1831	Awsa 22	B2/A7	537405	403216	Active
AL1837	Awsa 27	B2/A7	536781	402046	Active
AL1846	Jabal Elnaser 2	B2/A7	537943	402786	Active
AL1877	Abdulleh El Uqail	B2/A7	549427	391750	Abandoned
AL1906	Refinery 9	B2/A7	555666	416860	Proposed By WQIC-Not Active
AL2114	Race Club No14	B2/A7	538003	405216	Active
AL2344	Abu Nusair Society	K	550607	392970	Abandoned
AL2353	Taslam Hadi	BAS.	553884	444117	Active
AL2363	Ain El Rusaifeh 2	B2/A7	543865	404563	Proposed By WQIC-Not Active
AL2569	Mohammad Ahmad	B2/A7	547837	445939	Active
AL2573	Ahmad Khaleel	B2/A7	547469	447033	Active
AL2574	Abdelmajwed Hijazi	B2/A7	551203	443234	Active
AL2591	Khaleel Al Lobani	BAS.	554802	445153	Active
AL2596	Shihadeh Twal 3	B2/A7	552789	430666	Active
AL2600	Mohamad Adnan	B2/A7	554082	432938	Active
AL2691	Awajan 23	B2/A7	545028	412964	Active
AL2700	Samra Ob.1	B2/A7	558030	419119	Proposed By WQIC-Not Active
AL2702	Samra Ob.3	B2/A7	557089	416733	Proposed By WQIC-Not Active
AL2704	North Badia Observ.	B2/A7	564322	456313	Proposed By WQIC-Not Active
AL2711	Beerain 1	A1/A2	552002	399395	Active
AL2714	Race Club 18	B2/A7	538846	405630	Active
AL3179	Beerain 2	A1/A2	552353	399351	Active
AL3236	Jordan Worsted Miles2	B2/A7	544357	412358	Abandoned
AL3259	Shawkat Sbool	A4	547807	390482	Active
AL3306	Hallabat 3b	B2/A7	550994	439489	Active
AL3311	Baq'a 19	K	549437	391130	Active
AL3343	Wadi El Qattar 1	A1/A2	535539	409087	Active
AL3350	Wadi El Qattar 8	A4	533220	410189	Active
AL3353	Baej 1	B2/A7	581633	437592	Proposed By WQIC-Not Active
AL3357	Baq'a 20	K	548705	390038	Active
AL3364	Beerain 3	A1/A2	551982	400595	Active
AL3383	Hamidiyah Monitoring 1	B2/A7	574361	457057	WQIC Not active – Production well
AL3384	Hamidiyah Monitoring 2	B2/A7	565561	440982	WQIC Not Active – Abandoned
AL3385	Ruseifa Landfill Monit. 2	B2/A7	543091	411553	WQIC Not active
AL3386	Ruseifa Landfill Monit. 3	B2/A7	542933	410947	WQIC Not Active – Abandoned
AL3387	Samra Monitoring 4	B2/A7	559651	425996	WQIC Not active

Well ID	Well Name	Aquifer	JTM-N	JTM-E	Present Status
AL3389	Zarqa Indust. Monit. 2	B2/A7	556702	415276	WQIC Not active
AL3392	Wadi l'shash Monit. 1	B2/A7	544432	413911	WQIC Not active
AL3393	Pepsi Pool Monit. 1	B2/A7	542491	408421	WQIC Not active - Vandalized
AL3395	Sabha Monit. 1	B2/A7	581592	446488	WQIC Not active.
AL3396	Hussayniyat Monit. 2	B2/A7	571693	440615	WQIC not active.
AL3441	Supply No2	B2/A7	545827	416048	Abandoned
AL3442	Supply No3	B2/A7	547525	418056	Active
AL3490	Supply No 5	B2/A7	547697	417929	Active
AL3506	Supply No 4	A4	547951	419504	Active
F1105	Heyam El Kurdi	BAS.	546920	459376	Abandoned
F1123	Km 111 No2 Baghdad Road	BAS.	566163	461767	Active
F1124	Km124 Baghdad Road No17	BAS.	561709	473388	Active
F1310	Km114 Baghdad Road No16	BAS.	565145	464561	Abandoned
F1312	Km112 Baghdad Road No15	BAS.	565864	462578	Abandoned
F1389	Baghdad Road No5	BAS.	573769	463947	Abandoned
F3523	Mkeifteh 1	B2/A7	572834	468112	Proposed By WQIC-Not Active
F3531	Rakad El Shabeer	BAS.	565254	461655	Abandoned

Table 5: Proposed Water Quality Monitoring Wells to be Reactivated in AZB.

Well ID	Well Name	Aquifer	JTM-N	JTM-E	Justification
AL1118	Elkhirbeh El Samra	B2/A7	559822	419632	Important information source
AL1346	Phosphate Mines 8	B2/A7	543521	412824	Important information source
AL1377	Ibrahim Eshshami	K	547307	390895	Long sampling record
AL1381	Shawkat Sboul	K	547807	390482	Long sampling record & stopped recently
AL1398	Jafer Shami 1	K	551243	391400	Long sampling record
AL1474	Nabbel Abdellateef	B2/A7	581759	440275	Only well with record in North Badia area.
AL1684	Metal Factory	B2/A7	544717	406095	Important information source
AL1877	Abdulleh El Uqail	B2/A7	549427	391750	Important information source
AL2363	Ain El Rusaifeh 2	B2/A7	543865	404563	Important information source
AL2700	Samra Ob.1	B2/A7	558030	419119	Important information source
AL2702	Samra Ob.3	B2/A7	557089	416733	Important information source
AL2704	North Badia Observ.	B2/A7	564322	456313	Important information source
AL3353	Baej 1	B2/A7	581633	437592	Important information source
AL3383	Hamidiyah Monit. 1	B2/A7	574361	457057	Important information source
AL3384	Hamidiyah Monit. 2	B2/A7	565561	440982	Important information source
AL3385	Ruseifa Landfill Monit. 2	B2/A7	543091	411553	Important information source for GW pollution
AL3386	Ruseifa Landfill Monit. 3	B2/A7	542933	410947	Important information source for GW pollution
AL3387	Samra Monitoring 4	B2/A7	559651	425996	Important information source for GW pollution
AL3389	Zarqa Industrial Monit. 2	B2/A7	556702	415276	Important information source for GW pollution
AL3392	Wadi l'shash Monit. 1	B2/A7	544432	413911	Important information source for GW pollution
AL3395	Sabha Monit.1	B2/A7	581592	446488	Important location in the North Badia area
AL3396	Hussayniyat Monit. 2	B2/A7	571693	440615	Important location in the North Badia area
AL3441	Supply No 2	A4	545827	416048	The only A4 monitoring well in Balama
F1105	Heyam El Kurdi	BAS.	546920	459376	Important Location in the eastern part of the basin.
F1389	Baghdad Road No5	BAS.	573769	463947	Important Location in the eastern part of the basin.
F3523	Mkeifteh 1	B2/A7	572834	468112	Important Location in the eastern part of the basin.

Table 6: Proposed Water Quality Monitoring Wells to be Discontinued from the Monitoring Network in AZB

Well ID	Well Name	Aquifer	JTM-N	JTM-E	Justification
AL1078	Subhi Jab	B2/A7	556031	429825	Close AL1076
AL1168	Electrical Thermal	B2/A7	555231	417498	Close to AL1170
AL1169	Electrical Thermal	B2/A7	555259	417643	Close to AL1170
AL1175	Refinery 2	B2/A7	556227	416254	Close to AL-1176
AL1177	Refinery 4	B2/A7	555389	416675	Close to AL1176
AL1276	Distillation Co.	B2/A7	547160	413562	Close to AL1275
AL1318	Awajan 22	B2/A7	545360	413458	Close to AL1319
AL1385	Alluminumco.1	K	548781	391782	Last reading in 1988
AL1389	Salem Abbasi	K	551408	390678	Last reading in 1988
AL1395	Abdul Kaream Wraikat1	K	551136	392134	Close to AL1398
AL1428	Baq'a 1	K	549682	391598	Limited number of samples
AL1432	Baq'a 5	K	547471	390698	Last sample in 1997
AL1540	Baq'a 10	K	547924	391296	Last sample in 1997
AL1575	Abdelkareem Wraikat 3	K	551165	392159	Sampled only in 1996
AL1619	Suleiman Meqbel 1	B2/A7	559770	413076	Close to AL1620
AL1711	Pepsi Cola 3	B2/A7	541688	406057	Close to other wells
AL1762	Wasfi Ettall No2	BAS.	554746	443712	Close to AL1109 and AL2353
AI1789	Madonah No1	B2/A7	531256	414688	DRY
AL1846	Jabal Elnaser 2	B2/A7	537943	402786	Close to AL1831
AL1906	Refinery 9	B2/A7	555666	416860	Very Close to many active wells
AL2344	Abu Nusair Society	K	550607	392970	Last reading in 1991
AL2569	Mohammad Ahmad	B2/A7	547837	445939	Close to AL2573
AL2574	Abdelmajwed Hijazi	B2/A7	551203	443234	Close to AL1093
AL2591	Khaleel Al Lobani	BAS.	554802	445153	Close to AL1109
AI2600	Mohamad Adnan	B2/A7	554082	432938	Close to AL1319
AI2711	Beerain 1	A1/a2	552002	399395	Close to al3179
AL2714	Race Club 18	B2/A7	538846	405630	Close to AL2114
AL3236	Jordan Worsteds Miles2	B2/A7	544357	412358	Close to AL1307
AL3490	Supply No 5	B2/A7	547697	417929	Close to AL3442
F1310	Km114 Baghdad Road No16	BAS.	565145	464561	Not active since 1990- close to F1123
F1312	Km112 Baghdad Road No15	BAS.	565864	462578	Close to F1123 & One sampling year
F3531	Rakad El Shabeer	BAS.	565254	461655	Not active since 1995-close to F1123

Table 7: Stream Flow Monitoring Stations in AZB.

Station ID	JTM-E	JTM-N	Present Status
AI0040	388276	551143	Wadi flow Station Active
AL0060	393209	565162	Wadi flow Station Active
AL0061	390624	554004	Wadi flow Station Active
AL0062	402671	538704	Wadi flow Station Active
AL0063	411260	556162	Wadi flow Station Active
AL0064	411688	557855	Wadi flow Station Active
AL0065	397522	535790	Wadi flow Station Active
AL0068	373287	563893	Wadi flow Station Active
AL-New	430517	560646	Newly Installed Wadi Flow Station at Wadi Zadari

Figure 1: Proposed Action, Basalt Aquifer Water Level Monitoring Wells

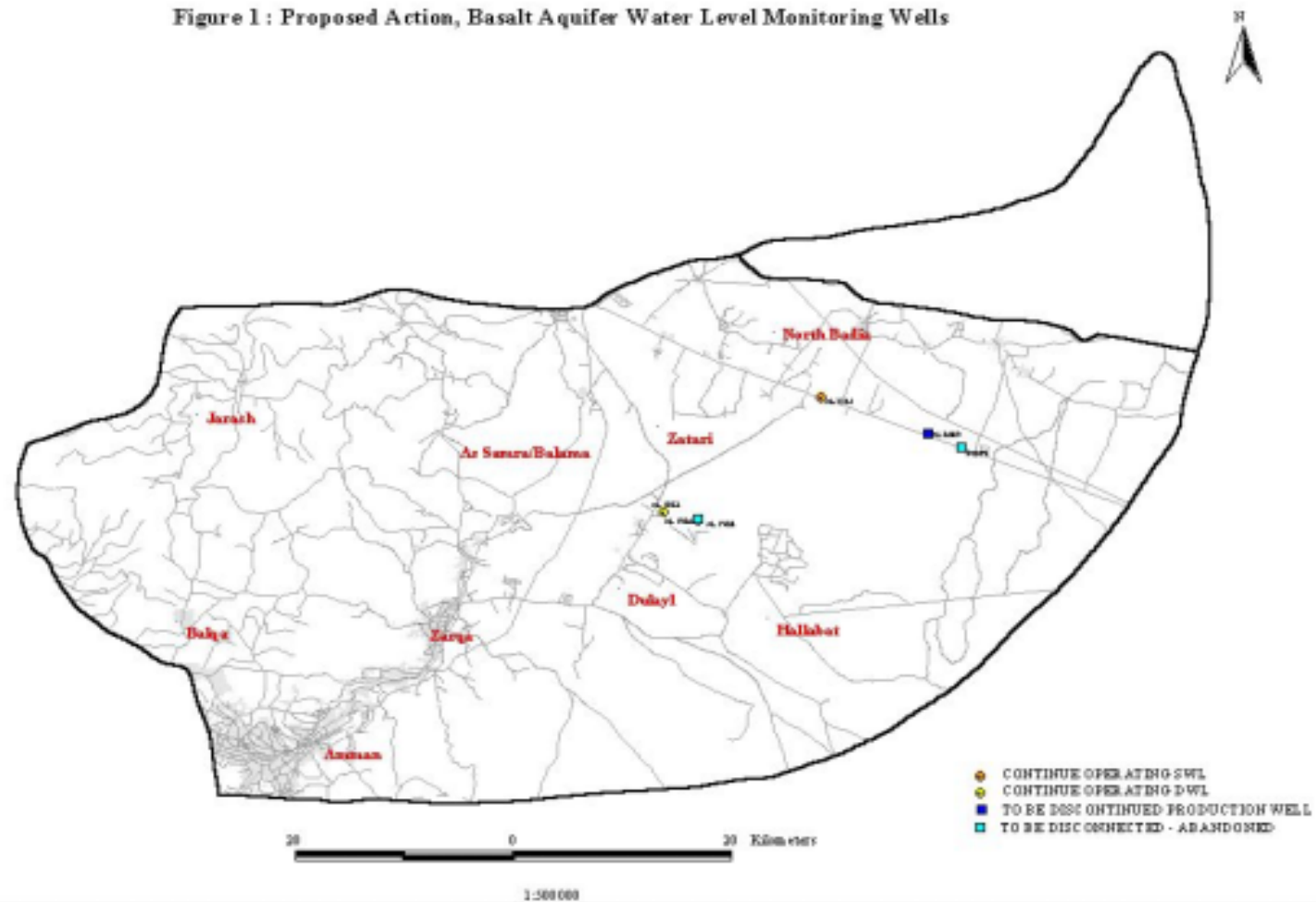


Figure 2 : Proposed Action, B2/A7 Aquifer Water Level Monitoring Wells

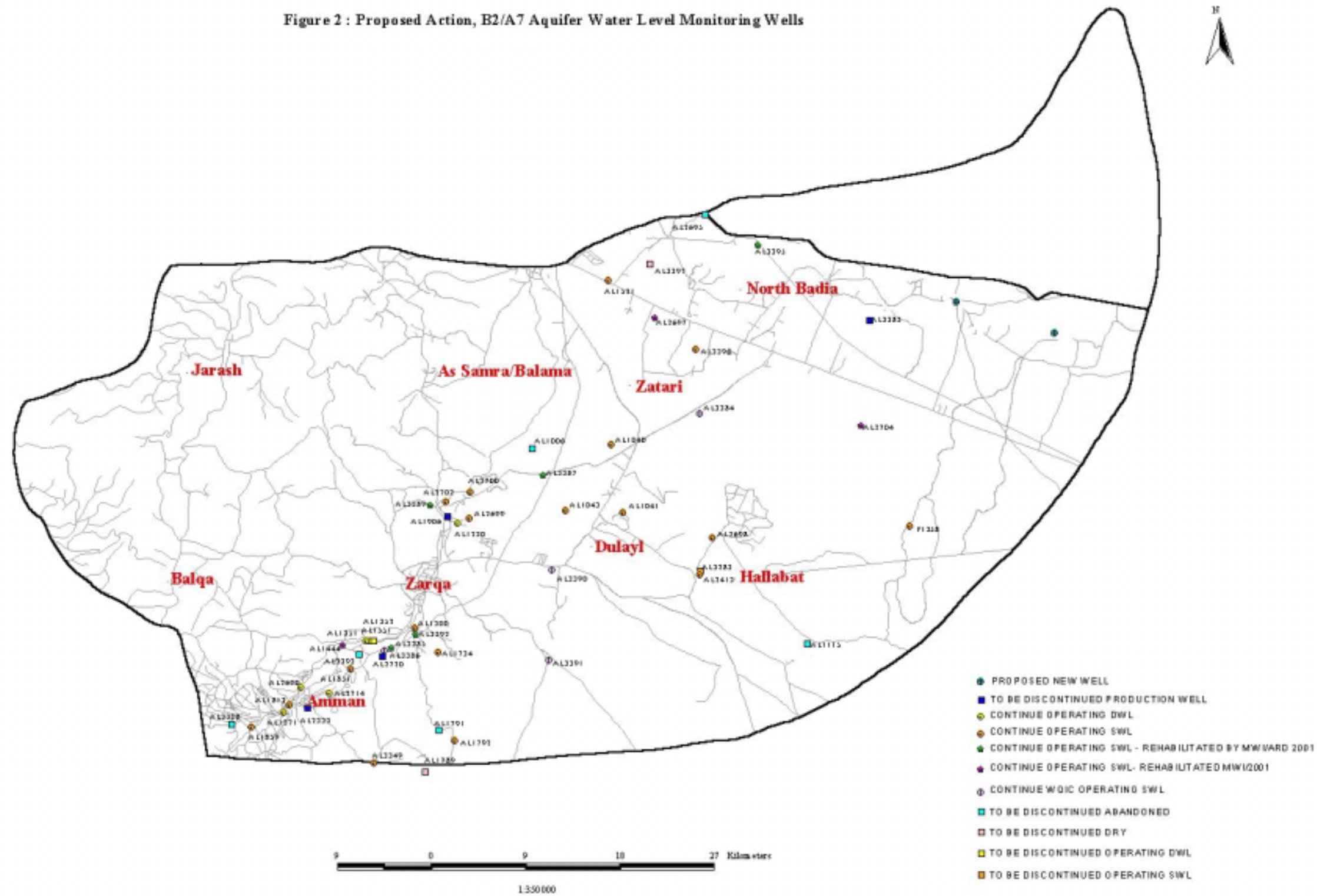


Figure 3 : Proposed Action, Hummar (A4) Aquifer Water Level Monitoring Wells

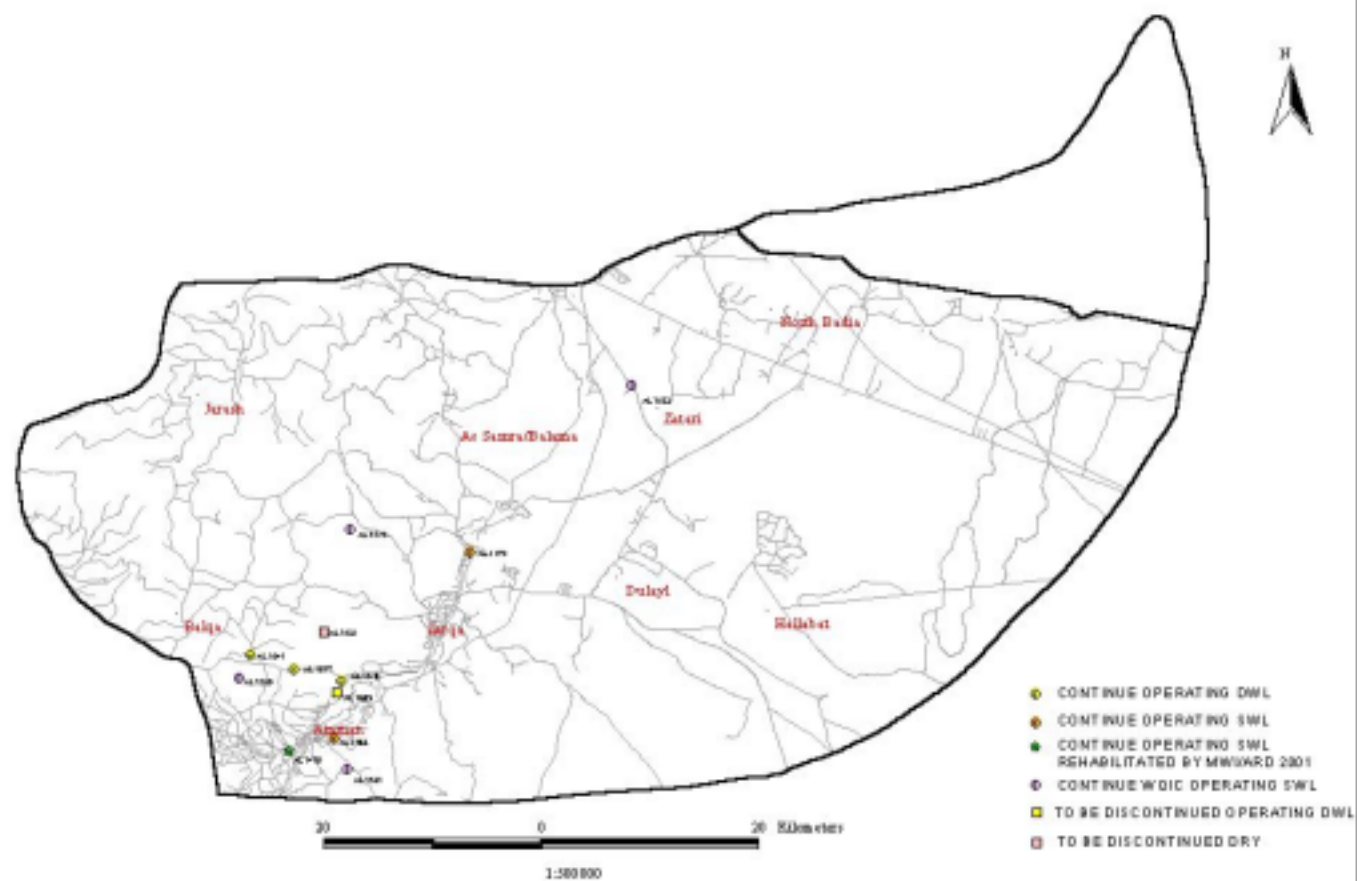


Figure 4 : Proposed Action, Kurnub (k) Aquifer Water Level Monitoring Wells

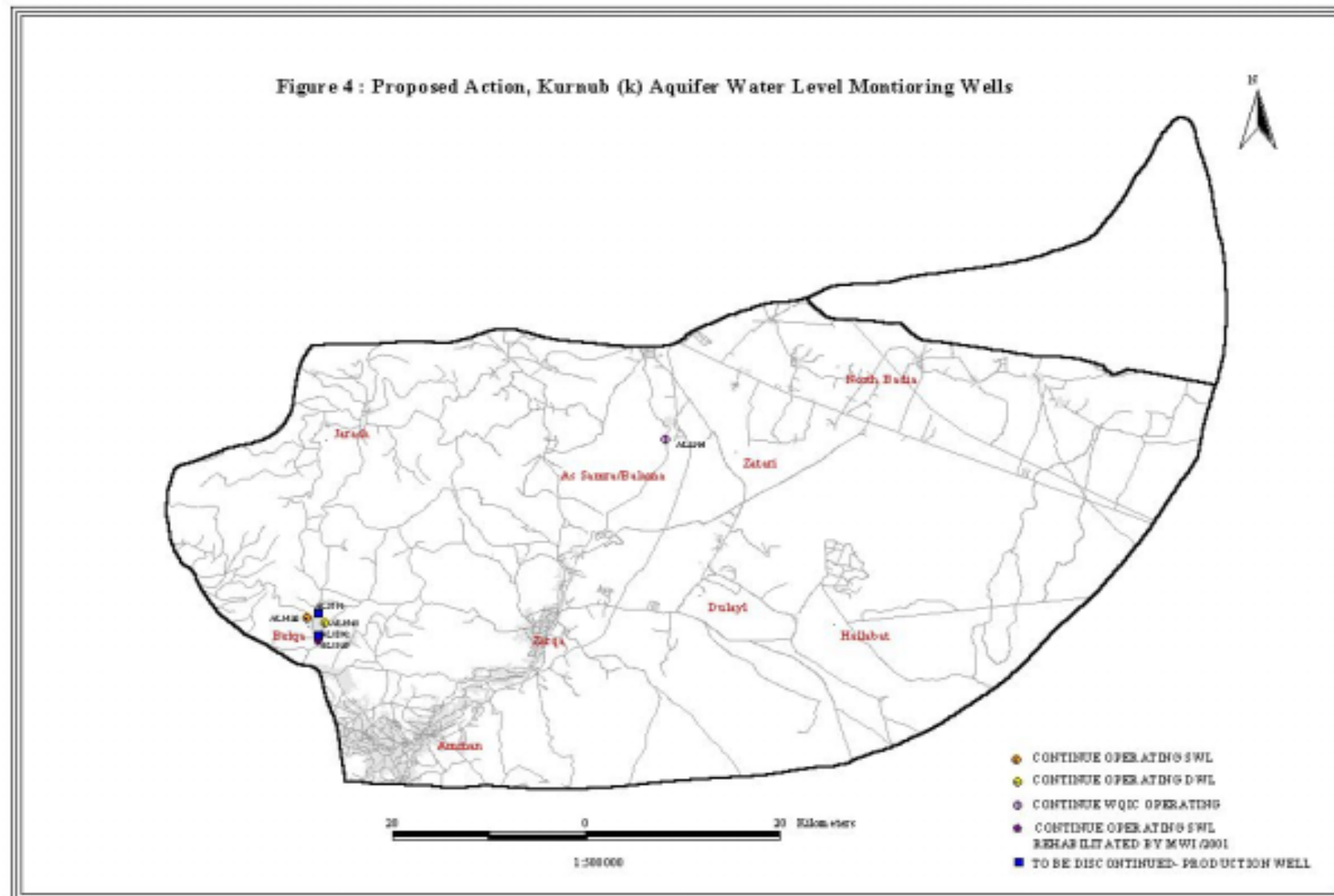


Figure 5 : Proposed Action, A1/A2 Aquifer Water Level Monitoring Wells

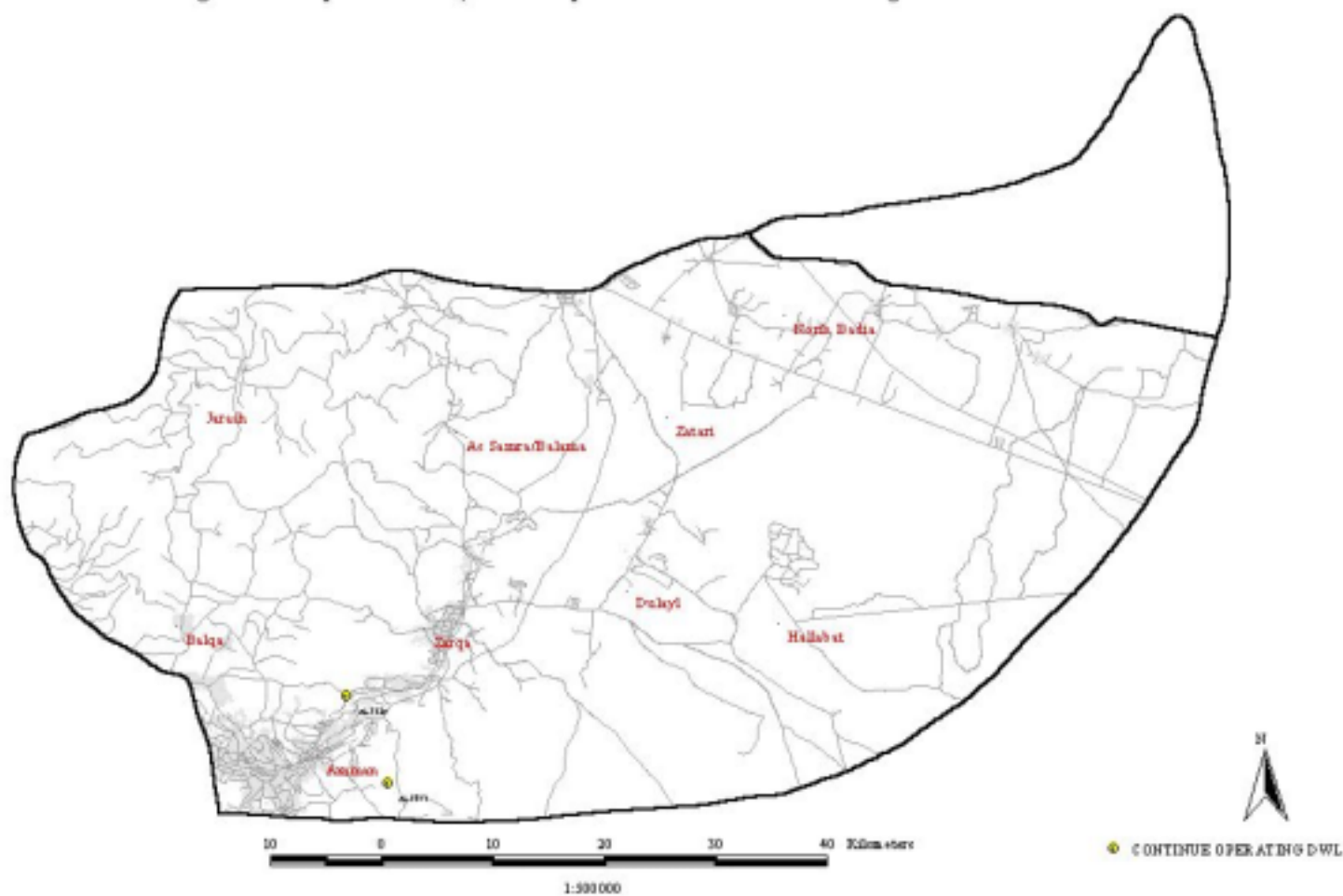


Figure 6 : Proposed Action, Zarqa Aquifer Water Level Monitoring Wells

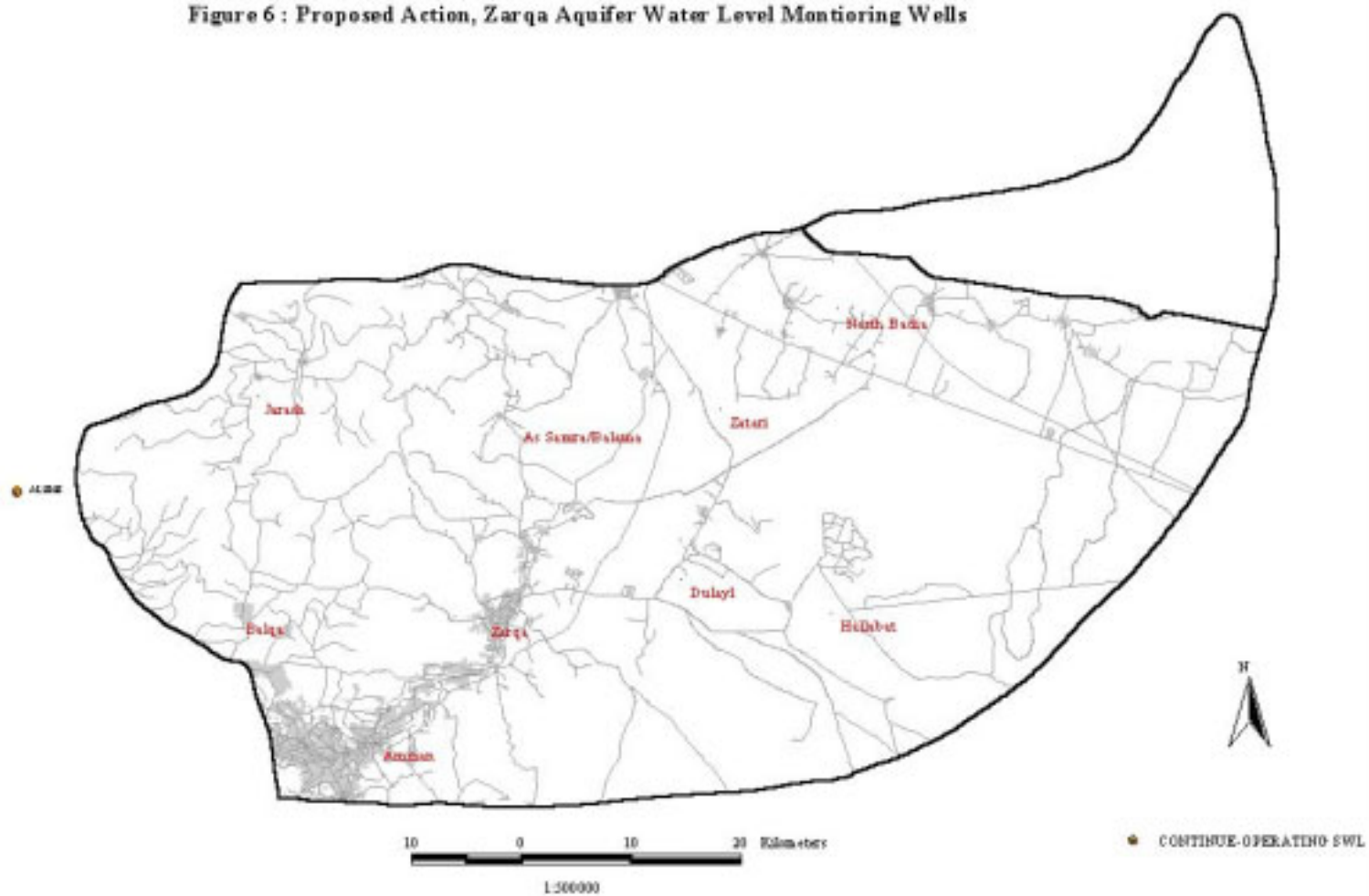


Figure (7): Proposed Action, Basalt Aquifer Water Quality Monitoring Wells

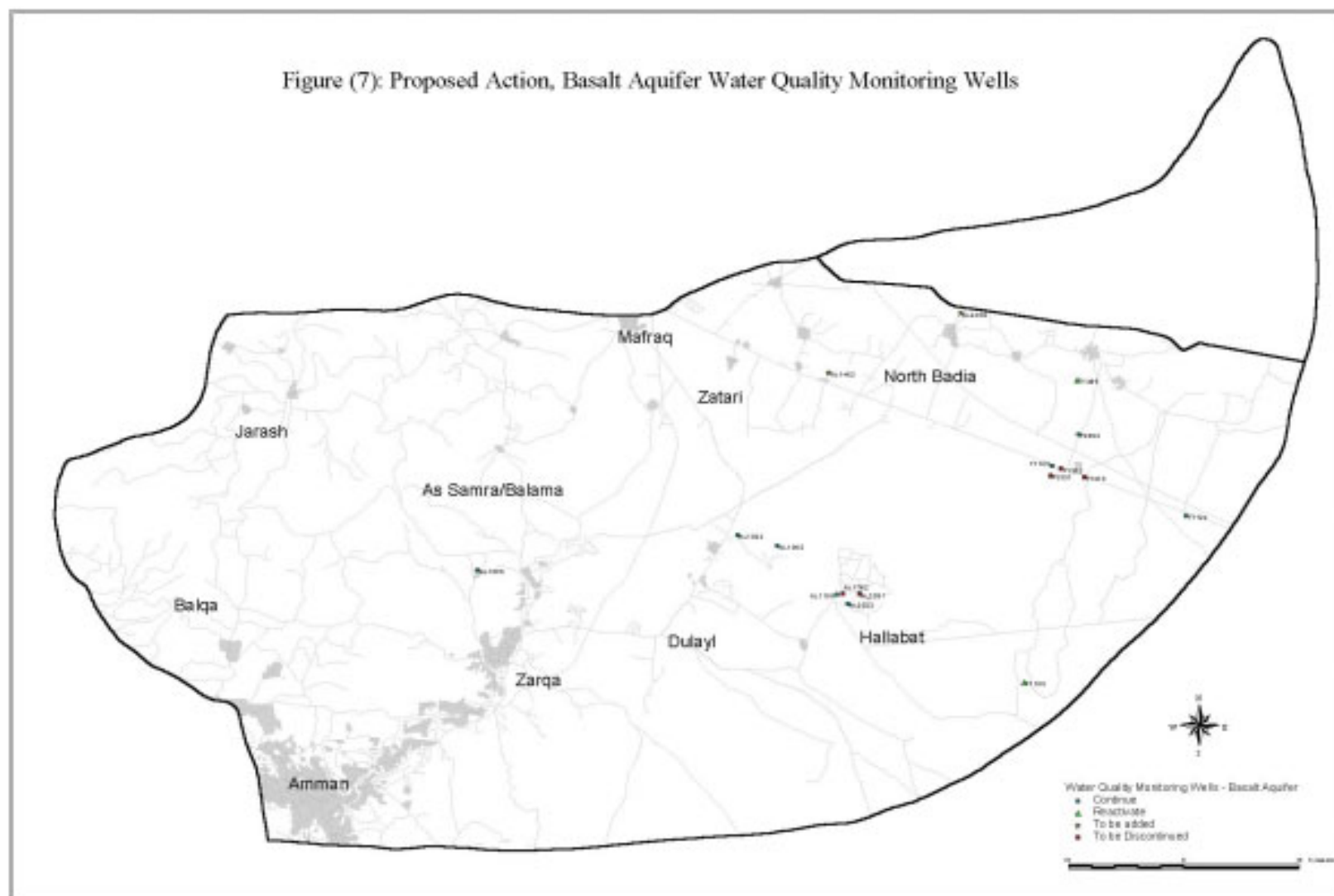


Figure (8): Proposed Action, B2/A7 Aquifer Water Quality Monitoring Wells

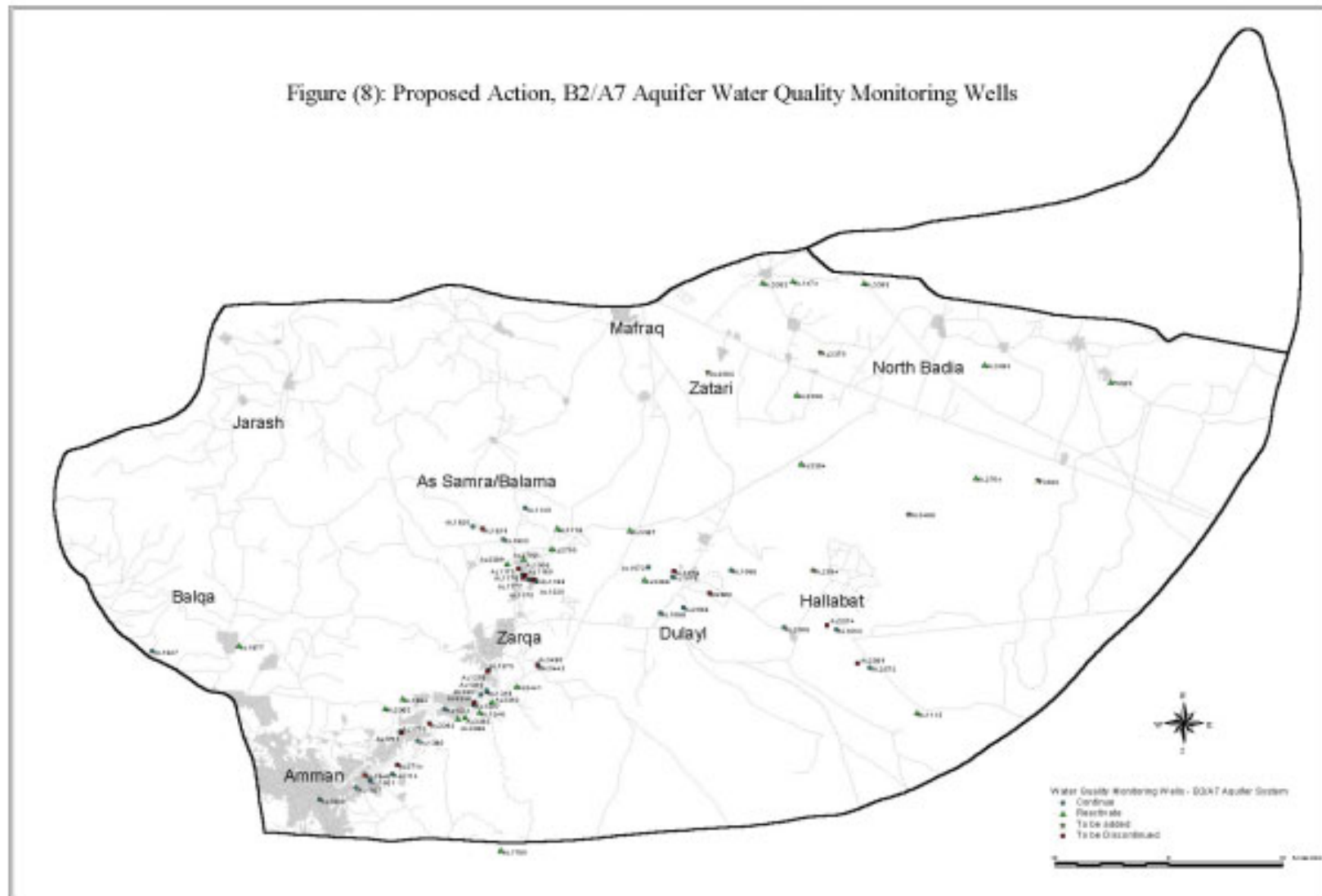


Figure (9): Proposed Action, "A4" Aquifer Water Quality Monitoring Wells

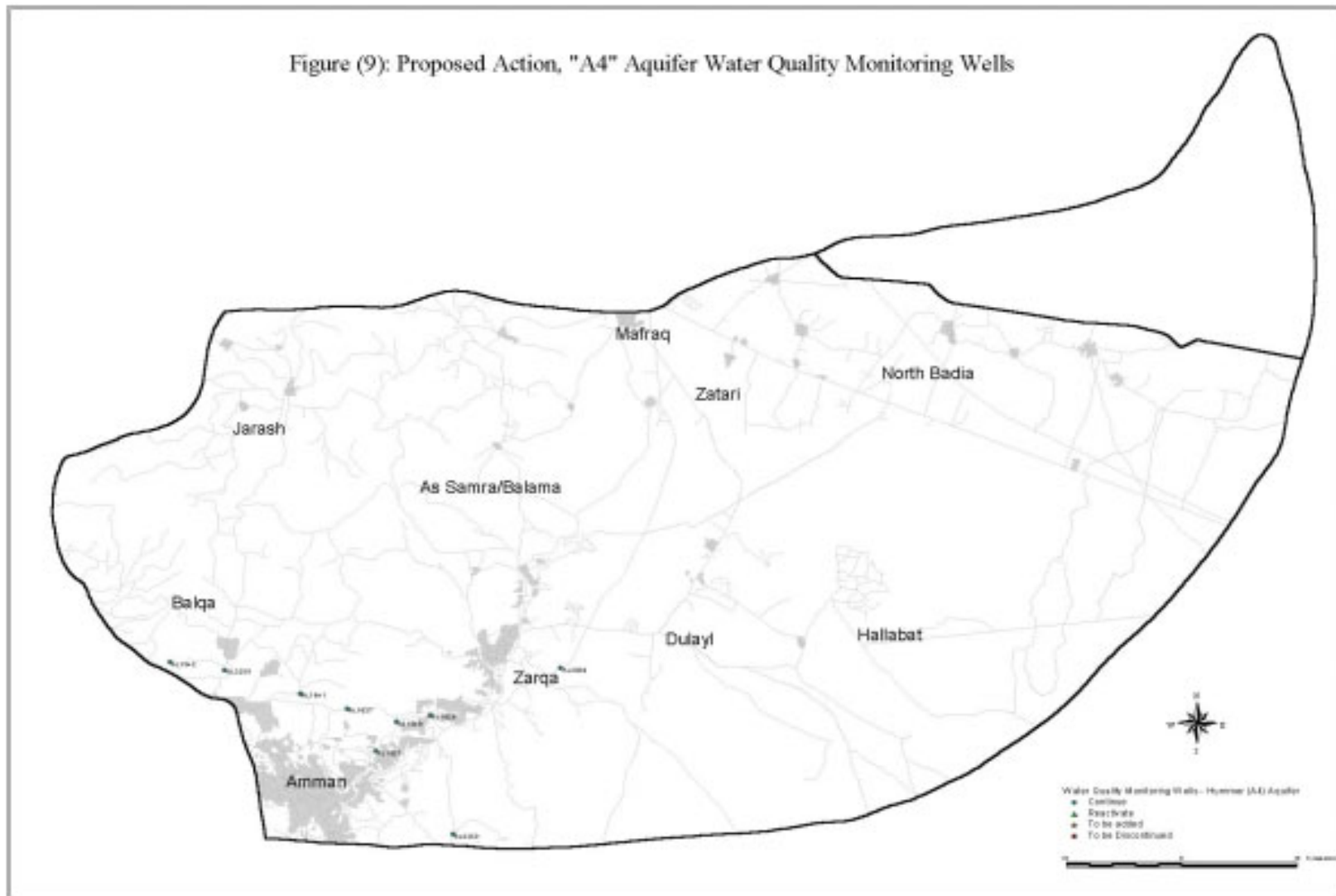


Figure (10): Proposed Action, "A1/A2" Aquifer Water Quality Monitoring Wells

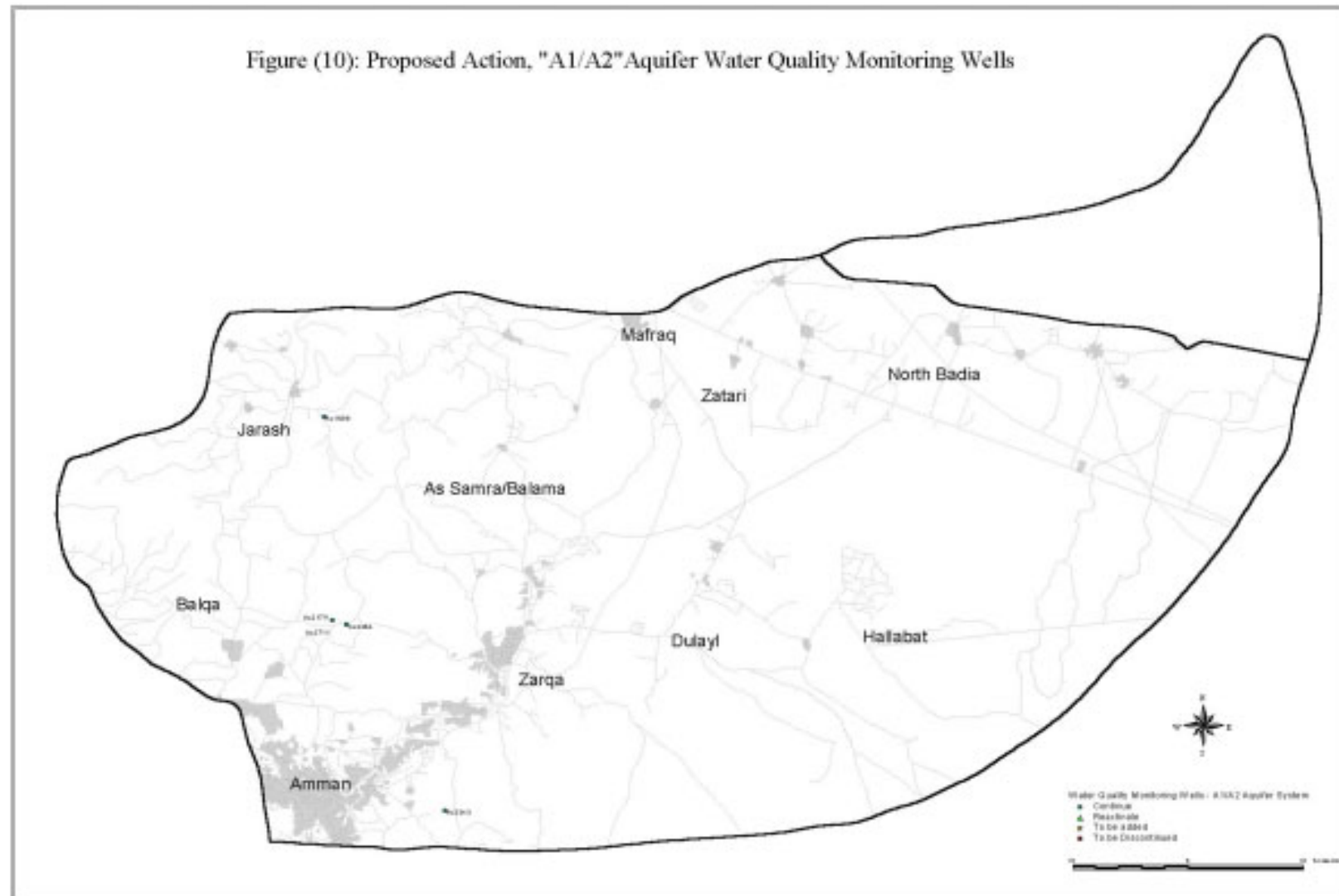


Figure (11): Proposed Action, Kurnub Aquifer Water Quality Monitoring Wells

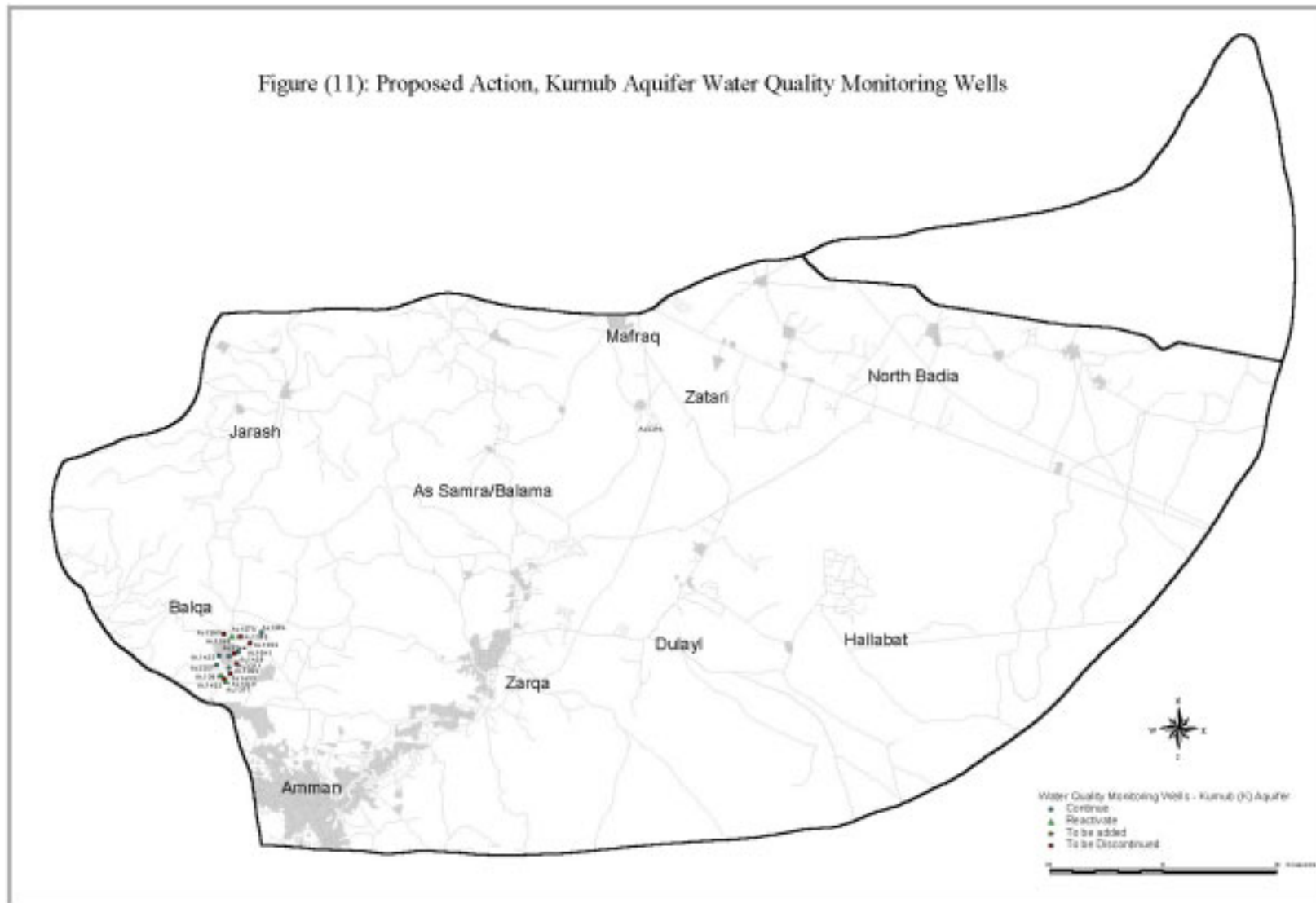
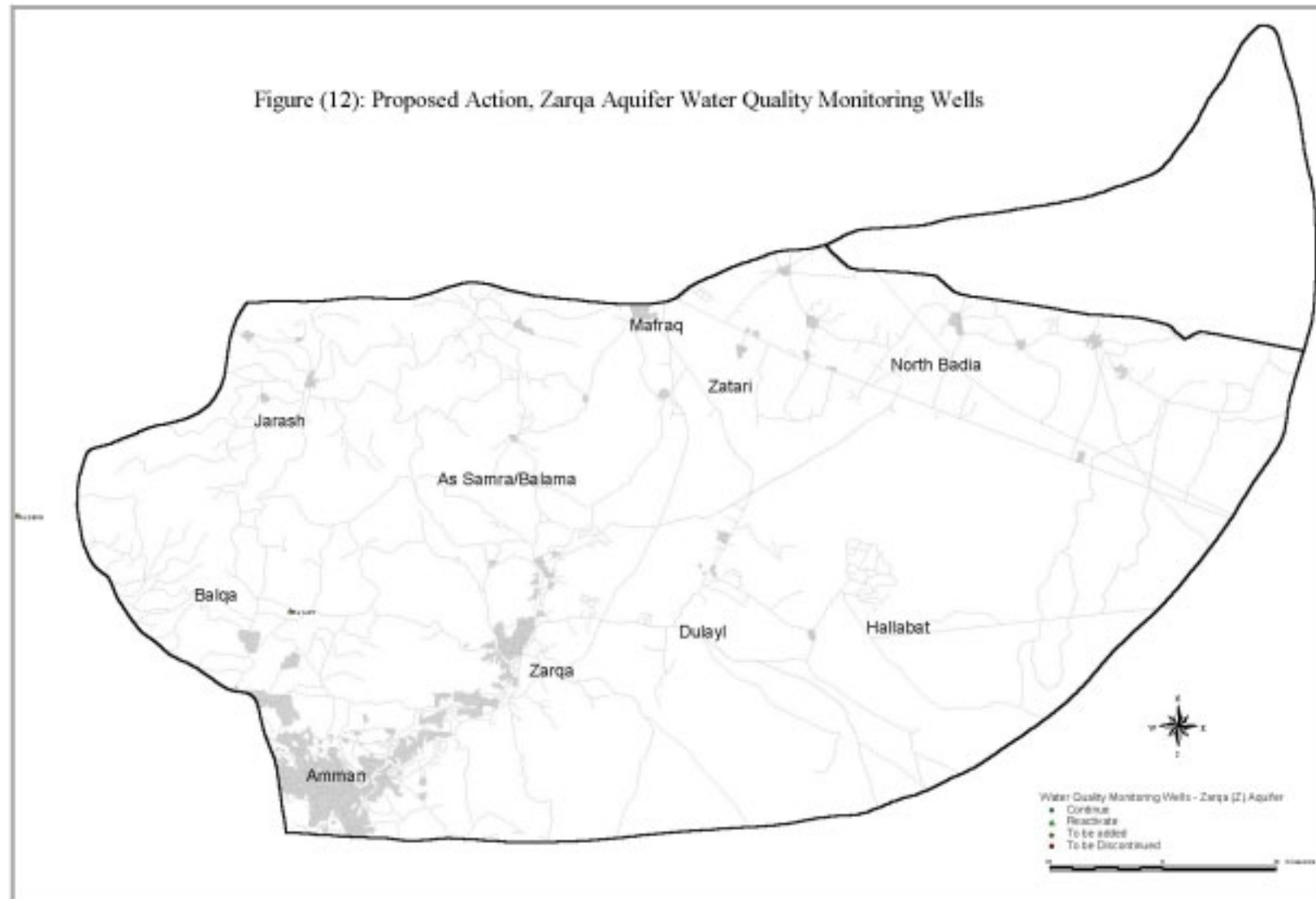
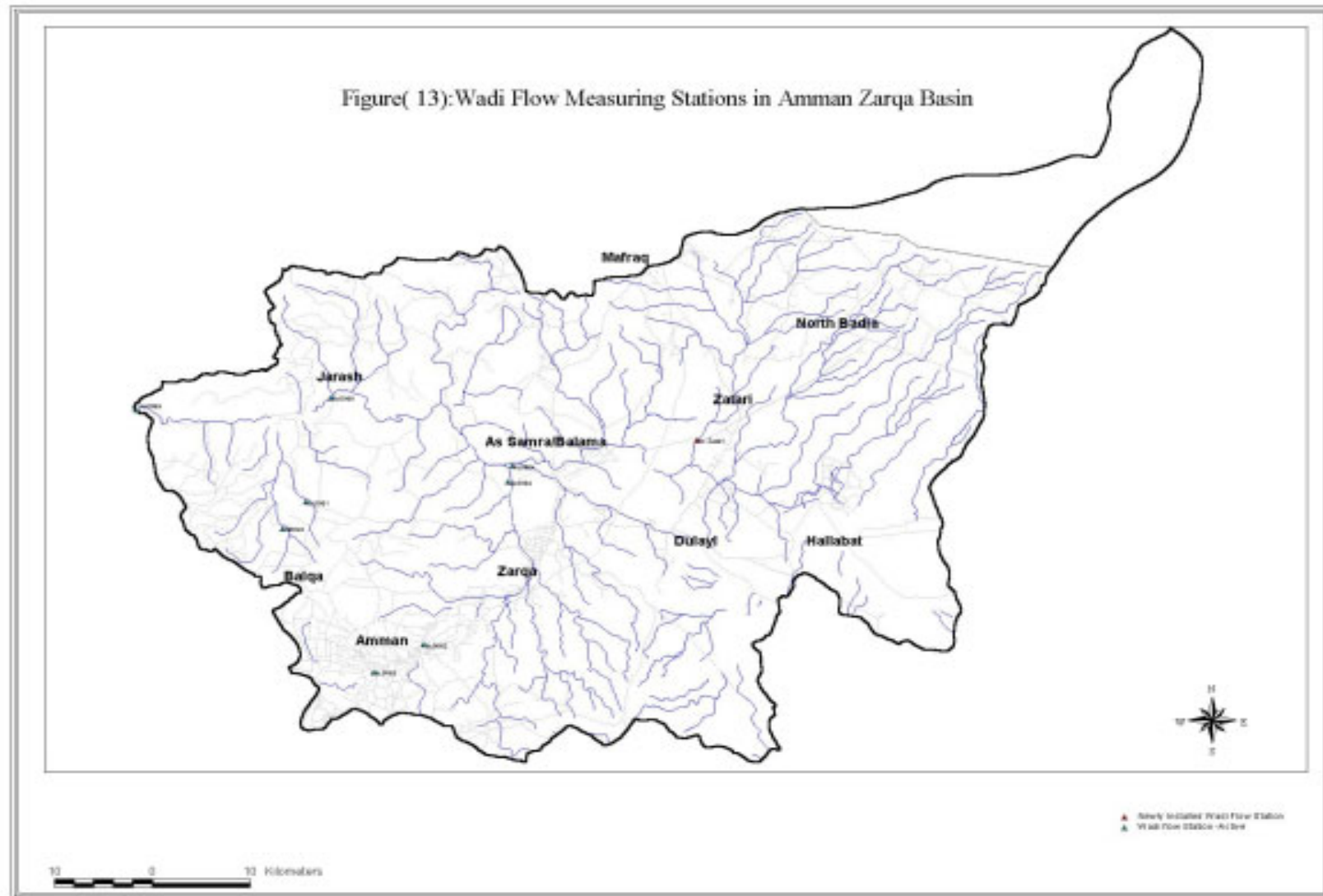


Figure (12): Proposed Action, Zarqa Aquifer Water Quality Monitoring Wells



Figure(13):Wadi Flow Measuring Stations in Amman Zarqa Basin



References

- Springs Monitoring Plan. Water Quality Improvement and Conservation Project. 1997.
- Hydrometeorological Stations Monitoring Upgrade Plan. Water Quality Improvement and Conservation Project. 1997.
- Water Quality Monitoring System Upgrade Plan-Appendix D-Water quality Improvement and Conservation Project. 1995.
- Water Quality Monitoring System Upgrade Plan-Appendix E-Water quality Improvement and Conservation Project. 1995.
- Ministry Of Water and Irrigation. Data Base .2000-2001.

ANNEX (1): Details of The Water Level Monitoring Wells in AZB.

Well – ID	Well Name	Oper. Year	Aquifer	JTM-N	JTM-E
AL1006	Dp 5 (Pp 145)	1988-1991	B2/A7	562086	424948
AL1022	Dp 16 Nra (Pp 315)	1998	BAS.	560005	434613
AL1040	Tw5 / W. Za'tari (Pp 157)	1968	B2/A7	562545	432555
AL1041	Tw6 / W. Dhuleil (Pp 158)	1968	B2/A7	556083	433655
AL1043	Tw15 / N. Dhuleil (Pp 160)	1968	B2/A7	556287	428160
AL1115	Zayid 2 Army	1998	B2/A7	543453	451115
AL1179	Refinery 6	1998	A4	555089	417150
AL1230	Hashimiya No 3	1999	B2/A7	555080	417840
AL1231	Mohammad A'del Sharif	1998	Allu	554867	411300
AL1300	Awajan Observation	1980	B2/A7	545034	413784
AL1351	Ruseifa Municipality 1	1999	B2/A7	543838	409431
AL1352	Ruseifa Municipality 2	1999	B2/A7	543897	409192
AL1371	Jamal Flour Mill	2000	B2/A7	537038	401264
AL1430	Baq'a 3 (W.S.C)	1985	k	550439	390088
AL1444	Ain El Ruseifa 8 /Observation	1985-1995	B2/A7	543444	406929
AL1521	Husain Air Force Base (Ba'ij)	1986	B2/A7	578201	432194
AL1539	Baq'a 11 (W.S.C)	1986-1994	k	547934	391286
AL1541	Baq'a 9 (W.S.C)	1992	k	549838	391997
AL1548	Awsa Seil El Rusaifeh No 3	1999	A4	543203	405302
AL1551	Ruseifa Municipality 4	1998	B2/A7	543779	409813
AL1637	Yajuz No 1	1999	A4	544363	401030
AL1641	Yajuz No 6	2000	A4	545690	396990
AL1689	Ain Ghazal Seil El Rusaifa 2a	1999	A4	542010	404822
AL1734	Zerqa Observation 1	1988	B2/A7	542727	415997
AL1782	Race Club No 13	1988	A4	537898	404752
AL1789	Madouneh No1	-	B2/A7	531256	414688
AL1791	Madouneh No3	-	B2/A7	535275	416024
AL1792	Madouneh No4	1997	B2/A7	534298	417609
AL1813	Awsa 5 Noureddeen	1997	B2/A7	537764	401868
AL1851	Mercury 5	1999	B2/A7	541163	407669
AL1859	Awsa 1 (Ras El Ain 1)	1999	B2/A7	535637	398201
AL1892	Baq'a Exp 6a Observation	1992-1993	k	548406	391169
AL1906	Refinery 9		B2/A7	555666	416860
AL1926	A'qib Dam Obs.1-Khaldiye	1986	BAS.	559278	437849
AL1928	A'qib Dam Obs.3-Khaldiye		BAS.	559173	437726
AL2333	Race Club No 29	1985-1987	B2/A7	537330	403555
AL2413	Hallabat 5	1998	B2/A7	550469	440947
AL2689	Km 107 Bagdad Road No 13 A		BAS.	567483	458715
AL2690	Ain Ghazal Station 2 (New)	2000	B2/A7	539415	402989
AL2695	Ba'ej 1 Obs.	1986-1990	B2/A7	584422	441389
AL2697	Hussayniyat Obs. 1	1986-1989	B2/A7	574587	436676
AL2698	Hallabat Obs. 1	1988	B2/A7	553671	442134
AL2699	Hashimiya Obs. 6	1988	B2/A7	555532	418958
AL2700	Samra Obs 1	1988	B2/A7	558030	419119
AL2702	Samra Obs 3	1986	B2/A7	557089	416733
AL2704	North Badiya Obs No1 (Salhiye)	1989-1991	B2/A7	564322	456313
AL2714	Race Club No 18	1998	B2/A7	538846	405630
AL2719	Baq'a 12 Obs.	1992-1993	k	550877	391134
AL2720	Waste Disposal Monit. Well		B2/A7	542314	410689
AL2808	Mu'addi Obs.1	1995-1996	z	560814	370288
AL3283	Hallabat 6	1997	B2/A7	550166	440942
AL3308	Mohajreen2		B2/A7	535798	396328
AL3324	Ain Ghazal Deep No 4	1999	A1/A2	543350	405454

Well – ID	Well Name	Oper. Year	Aquifer	JTM-N	JTM-E
AL3343	Wadi El Qattar 1	1998	A1/A2	535539	409087
AL3349	Wadi El Qattar 7	1997	B2/A7	532233	409953
AL3361	A'qib 3 (Km97.5)	1988- 1993/2000	BAS.	570942	449070
AL3383	Hamidiyyah Monit. 1		B2/A7	574361	457057
AL3384	Hallabat Monit. 2	1997	B2/A7	565561	440982
AL3385	Ruseifa Landfill Monit. 2		B2/A7	543091	411553
AL3386	Ruseifa Landfill Monit. 3	1997	B2/A7	542933	410947
AL3387	Samra Monitoring 4		B2/A7	559651	425996
AL3389	Zerqa Industrial Monit. 2		B2/A7	556702	415276
AL3390	Tafeh East Monitoring 1	1997	B2/A7	550614	426901
AL3391	Tafeh South Monit. 2	1998	B2/A7	541992	426557
AL3392	Wadi l'shash Monit. 1		B2/A7	544432	413911
AL3393	Pepsi Pool Monit. 1		B2/A7	542491	408421
AL3394	Thaghret Al Job Monit. 1	1997	k	569593	427043
AL3395	Sabha Monitoring 1		B2/A7	581592	446488
AL3396	Hussayniyat Monit. 2		B2/A7	571693	440615
AL3397	Ba'ej Monitoring 3		B2/A7	579702	436147
AL3430	Maqarr Investigation 14b	1999	A4	536727	400644
AL3519	Sukhneh Monit.	2000	A4	557142	406181
AL3520	Yajuz 1 Monit.	2000	A4	543507	395904
AL3521	Yajuz 2 Monit.	2000	A4	547681	403625
AL3522	Za'tari Monit.	2000	A4	570444	431907
AL3523	Ruseifa Monit. 1	2000	A4	535172	405820
F1079	Km 111	1966	BAS.	566097	461779
F1358	Ndw-3	1985	B2/A7	554767	460981

ANNEX (II): Details of The Water Quality Monitoring Wells in AZB

Well ID	WELL NAME	Aquifer	JTM-N	JTM-E
AL1005	F.Shलिए	BAS.	559060	438061
AL1022	Dp16nra	BAS.	560005	434613
AL1072	Arnous Al Uqial	B2/A7	556339	427603
AL1076	Saeed Qtashate2	B2/A7	555556	429711
AL1078	Subhi Jab	B2/A7	556031	429825
AL1086	Jack Khayyat	B2/A7	556118	434866
AL1088	Shihada Twal 2	B2/A7	552308	428644
AL1093	Abdulhamead Frahat	B2/A7	550859	444067
AL1109	Wasfi El-Tal 1	BAS.	554735	443152
AL1115	Elkhirbeh El Samra	B2/A7	543453	451115
AL1118	Elkhirbeh El Samra	B2/A7	559822	419632
AL1120	Ali Abu Adaila	B2/A7	561608	416847
AL1168	Electrical Thermal	B2/A7	555231	417498
AL1169	Electrical Thermal	B2/A7	555259	417643
AL1170	Electrical Thermal	B2/A7	555303	417079
AL1175	Refinery 2	B2/A7	556227	416254
AL1176	Refinery 3	B2/A7	555752	416551
AL1177	Refinery 4	B2/A7	555389	416675
AL1205	Ahmad Abdelhameed	BAS.	556874	412128
AL1230	Hashimyia No3	B2/A7	555080	417840
AL1275	Jordan Beer Co.	B2/A7	547221	413630
AL1276	Distillation Co.	B2/A7	547160	413562
AL1307	Jordan Diary Co.	B2/A7	544178	412340
AL1318	Awajan 22	B2/A7	545360	413458
AL1319	Awjan 21	B2/A7	545429	413485
AL1346	Phosphate Mines 8	B2/A7	543521	412824
AL1360	Polytechnique 1	B2/A7	540954	407452
AL1377	Ibrahim Eshshami	K	547307	390895
AL1381	Shawkat Sboul	K	547807	390482
AL1385	Alluminumco.1	K	548781	391782
AL1389	Salem Abbasi	K	551408	390678
AL1393	Abu Nusair	K	550601	393010
AL1394	Jordan Tiles & Blocks	K	551545	393991
AL1395	Abdul Kareem Wraikat1	K	551136	392134
AL1398	Jafer Shami 1	K	551243	391400
AL1421	Mubis S11	Z	551243	391400
AL1425	Baq'a 2	K	549513	390239
AL1428	Baq'a 1	K	549682	391598
AL1432	Baq'a 5	K	547471	390698
AL1433	Baq'a 6	K	548396	391173
AL1462	Nayef Amer Musa	BAS.	574441	442495
AL1474	Nabbel Abdellateef	B2/A7	581759	440275
AL1540	Baq'a 10	K	547924	391296
AL1541	Baq'a 9	K	549838	391997
AL1542	Yazidiyya No3	A4	548475	385733
AL1548	Awsa Seil El Rusaifa	A4	543203	405302
AL1551	Ruseifa Municipality	B2/A7	543779	409813
AL1575	Abdelkareem Wraikat 3	K	551165	392159
AL1608	Faleh Mustafa	A1/A2	570349	398676
AL1619	Suleiman Meqbel 1	B2/A7	559770	413076
AL1620	Barakah Mustafa	B2/A7	559993	412290
AL1622	Saleh Khalifa	B2/A7	558849	414922
AL1627	Yazidiyya No2	B2/A7	548950	384201

Well ID	WELL NAME	Aquifer	JTM-N	JTM-E
AL1637	Yajuz No.1	A4	544363	401030
AL1641	Yajuz No.6	A4	545690	396990
AL1684	Metal Factory	B2/A7	544717	406095
AL1710	Pepsi Cola 2	B2/A7	541842	405913
AL1711	Pepsi Cola 3	B2/A7	541688	406057
AL1762	Wasfi Ettall No2	BAS.	554746	443712
AL1789	Madouneh No1	B2/A7	531256	414688
AL1821	Ain Ghazal S8	A4	540581	403508
AL1826	Ruseifa 18/Amman	A4	543809	408229
AL1830	Awsa 21	B2/A7	535757	398828
AL1831	Awsa 22	B2/A7	537405	403216
AL1837	Awsa 27	B2/A7	536781	402046
AL1846	Jabal Elnaser 2	B2/A7	537943	402786
AL1877	Abdulleh El Uqail	B2/A7	549427	391750
AL1906	Refinery 9	B2/A7	555666	416860
AL2114	Race Club No14	B2/A7	538003	405216
AL2344	Abu Nusair Society	K	550607	392970
AL2353	Taslam Hadi	BAS.	553884	444117
AL2363	Ain El Rusaifeh 2	B2/A7	543865	404563
AL2370	Irfan Ghathwan	B2/A7	575449	442662
AL2498	Jhaish El Dbei	BAS.	580958	454366
AL2569	Mohammad Ahmad	B2/A7	547837	445939
AL2573	Ahmad Khaleel	B2/A7	547469	447033
AL2574	Abdelmajwed Hijazi	B2/A7	551203	443234
AL2591	Khaleel Al Lobani	BAS.	554802	445153
AL2594	Misnad Al Nwairan	B2/A7	556153	442055
AL2596	Shihadeh Twal 3	B2/A7	552789	430666
AL2600	Mohamad Adnan	B2/A7	554082	432938
AL2691	Awajan 23	B2/A7	545028	412964
AL2700	Samra Ob.1	B2/A7	558030	419119
AL2702	Samra Ob.3	B2/A7	557089	416733
AL2704	North Badia Observation	B2/A7	564322	456313
AL2711	Beerain 1	A1/A2	552002	399395
AL2714	Race Club 18	B2/A7	538846	405630
AL2808	Muaddi Obs.1	Z	560814	370288
AL3065	Sulphochemicals	B2/A7	573679	432860
AL3179	Beerain 2	A1/A2	552353	399351
AL3236	Jordan Worsted Miles2	B2/A7	544357	412358
AL3259	Shawkat Sbool	A4	547807	390482
AL3306	Hallabat 3b	B2/A7	550994	439489
AL3311	Baq'a 19	K	549437	391130
AL3343	Wadi El Qattar 1	A1/A2	535539	409087
AL3350	Wadi El Qattar 8	A4	533220	410189
AL3353	Baej 1	B2/A7	581633	437592
AL3357	Baq'a 20	K	548705	390038
AL3364	Beerain 3	A1/A2	551982	400595
AL3383	Hamidiyah Monit. 1	B2/A7	574361	457057
AL3384	Hamidiyah Monit. 2	B2/A7	565561	440982
AL3385	Ruseifa Landfill Monit. 2	B2/A7	543091	411553
AL3386	Ruseifa Landfill Monit. 3	B2/A7	542933	410947
AL3387	Samra Monit.4	B2/A7	559651	425996
AL3389	Zarqa Industrial Monit. 2	B2/A7	556702	415276
AL3392	Wadi I'shash Monit. 1	B2/A7	544432	413911
AL3393	Pepsi Pool Monit. 1	B2/A7	542491	408421
AL3394	Thaghret Al Job Monit.1	K	569593	427043

Well ID	WELL NAME	Aquifer	JTM-N	JTM-E
AL3395	Sabha Monit. 1	B2/A7	581592	446488
AL3396	Hussayniyat Monit. 2	B2/A7	571693	440615
AL3441	Supply No2	B2/A7	545827	416048
AL3442	Supply No3	B2/A7	547525	418056
AL3466	Hasan Salman Odeh	B2/A7	561137	450459
AL3490	Supply No 5	B2/A7	547697	417929
AL3506	Supply No 4	A4	547951	419504
F1105	Heyam El Kurdi	BAS.	546920	459376
F1123	Km 111 No2 Baghdad Road	BAS.	566163	461767
F1124	Km124 Baghdad Road No17	BAS.	561709	473388
F1310	Km114 Baghdad Road No16	BAS.	565145	464561
F1312	Km112 Baghdad Road No15	BAS.	565864	462578
F1389	Baghdad Road No5	BAS.	573769	463947
F3523	Mkeifteh	B2/A7	572834	468112
F3531	Rakad El Shabeer	BAS.	565254	461655
F3930	Ahmad Abu Rumman	B2/A7	564098	461726